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PRO-POOR GROWTH:
CONCEPTS AND MEASUREMENT
WITH COUNTRY CASE STUDIES

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ABSTRACT

This paper looks into the interrelation between economic growth, inequality, and poverty. Using the notion of pro-poor growth, this study examines to what extent the poor benefit from economic growth. First, various approaches to defining and measuring pro-poor growth are scrutinized using a variety of criteria. It is argued that the satisfaction of a monotonicity axiom is a key criterion for measuring pro-poor growth. The monotonicity axiom sets out a condition that the proportional reduction in poverty is a monotonically increasing function of the pro-poor growth measure. This paper proposes a pro-poor growth measure that satisfies the monotonicity criterion. This measure is called a 'poverty equivalent growth rate', which takes into account both the magnitude of growth and how the benefits of growth are distributed to the poor and the non-poor. As the new measure satisfies the criterion of monotonicity, it is indicative that to achieve rapid poverty reduction, the poverty equivalent growth rate ought to be maximized rather than the actual growth rate. The methodology developed in the paper is then applied to three Asian countries, namely, the Republic of Korea, Thailand, and Vietnam.

1 INTRODUCTION

The most important goal for the developmental effort has become poverty reduction, which can be achieved by economic growth and/or by the distribution of income. Issues related to the benefits of growth accrued to the poor have also been a priority of development policy in the 1990s. An emerging consensus is that growth alone is a rather blunt tool for poverty reduction. In addition to the

emphasis on poverty reduction, policies of redistribution of income and assets have become increasingly important. A policy agenda that addresses both distributional concerns and poverty reduction could lead to the enhancement of both economic growth and equity. Indeed, the relation among growth, inequality and poverty is complex and interdependent one.

A view widely held in the domain of development economics is that the benefits of economic growth diffuse automatically across all segments of society. This is indeed the well-known trickle down hypothesis, which was a dominant thinking in the 50s and 60s. In a similar manner, the result derived from a number of recent studies suggests that economic growth overall reduces poverty. Among these studies, Dollar and Kraay (2002)'s paper has attracted much attention.[1] This study, based on cross-country regressions, has been criticized for depicting only an average picture of the relation between growth and poverty. When large differences across countries are averaged out, the results are potentially deceptive because country-specific experiences can differ widely. Under the surface of aggregate outcomes there are often individual countries that experience an increase in poverty during spells of positive economic growth, at least in the short run (Ravallion, 2001).

The relation between growth and inequality has also been debated extensively. In his well-known 1955 article, Simon Kuznets found an inverted-U pattern between per capita income and inequality based on a cross-section of countries: as per capita income rises, inequality first worsens and then improves. The major driving force was presumed to be structural change that occurred because of labor shifts from a poor and less productive traditional sector to a more productive and differentiated modern sector. The hypothesis was supported by a number of studies – including Kravis (1960), Oshima (1962), Adelman and Morris (1971), Paukert (1973), Ahluwalia (1974, 1976), Robinson (1976), and Ram (1988). Yet, with better quality data sets and testing on individual countries, Kuznets' inverted-U has been challenged and seems to have evaporated (Anand and Kanbur 1984, Fields 1989, Oshima 1994, Deininger and Squire 1996). For instance, Deininger and Squire (1996) carried a comprehensive test of the hypothesis and confirmed that there was no evidence of an inverted-U curve for individual countries.

Overall, the relation between growth and poverty is a complex one, and is also determined by the level and changes in inequality. Pro-poor growth is concerned with the interrelation between these three elements: growth, poverty, and inequality. While there remains no consensus on how to define or measure pro-poor growth, the issue has attracted a fair amount of attention within academia as well as among development practitioners. The pro-poor growth debate has its roots in the pro-distribution arguments by Chenery and Ahluwalia in the 1970s. Chenery and Ahluwalia's (1974) model of 'redistribution with growth' could be regarded as the inception of the whole debate on pro-poor growth, as well as a culmination of the critique of the trickle-down hypothesis. More recently, pro-poor growth was also implicit in the term 'broad-based growth' used in the 1990 World Development Report. While the concept was never defined at that time, it subsequently shifted to become referred to as pro-poor growth during the course of the 1990s.

This paper proposes a measure of pro-poor growth derived from the idea of 'poverty equivalent growth rate (PEGR)', which takes into account not only the magnitude of growth, but also how much benefit the poor receive from the growth. It will be shown that proportional reduction in poverty is a monotonically increasing function of the PEGR; the larger the PEGR, the greater the proportional reduction in poverty will be. Thus, maximizing the PEGR implies a maximum reduction in poverty. This paper derives the PEGR for an entire class of additively decomposable poverty measures – including the Foster-Greer-Thorbecke (1984) and Watts (1968) measures.

Including Section 1 (Introduction), this paper is organized in nine sections. Section 2 provides a practical review of various approaches for defining and measuring pro-poor growth. It discusses the relative strengths and weaknesses of different approaches to defining and measuring pro-poor growth. Section 3 describes additively decomposable poverty measures, whilst section 4 is devoted to the formal derivation of the poverty equivalent growth rate. Section 5 provides analytical discussions on why poverty reduction varies across countries. Section 6 explains how to compute the new pro-poor growth measure. While section 7 outlines the data sources as well as the concepts used in the paper, section 8 illustrates empirical results on Korea, Thailand, and Vietnam. Section 9 contains some concluding remarks.

2 PRO-POOR GROWTH CLASSIFICATION

Pro-poor growth may be referred as growth that benefits the poor and provides them with opportunities to improve their economic situation, as often cited by international agencies (UN 2000, OECD 2001). This definition is vague and provides little guidance to its measurement or to its policy implications. While there remains no consensus as to the definition of this concept and its measurement, the issue has received a fair amount of attention within academia and among development practitioners. Lately, a number of studies have attempted to define and measure a pro-poor growth. These studies include Kakwani and Pernia (2000), McCulloch et. al. (2000), Ravallion and Chen (2003), and Son (2003).[2] Each of these studies has its own merits and limitations.

These four measures can be compared in view of whether they: (i) use a weak or a strong definition of pro-poor growth, and (ii) use a relative or absolute approach under the strict approach; (ii) require a specific poverty line and poverty measure (partial vs. full approach); and (iii) satisfy an axiom called 'monotonicity'.

WEAK VS STRONG DEFINITIONS

The World Bank's definition of pro-poor growth is rather weak. It defines growth as pro-poor if it reduces poverty (howsoever small) (Ravallion 2004). Under this definition, the poor may receive only a small fraction of total benefits of growth, still the growth process will be called pro-poor. In this paper, we characterize this situation as trickle-down when the poor receive proportionally less benefits from growth than the non-poor. Literally the word "pro-poor" means that the poor should

receive more but not less benefits than the non-poor. The World Bank's definition is rather too weak and will classify most growth processes as pro-poor.[3]

The other broad definition of pro-poor growth is stranger and emphasizes inequality reduction that occurs with poverty reduction during economic growth. Studies – including McCulloch and Baulch (2000), Kakwani and Pernia (2000), and Son (2003) – all suggest a measure of pro-poor growth that takes into account both reduction in poverty as well as improvement in inequality.

The stronger definition used in this paper is further categorized in terms of *relative* or *absolute* pro-poor growth. The relative concept arises when economic growth benefits the poor proportionally more than the non-poor. The implication is that while growth reduces poverty, it also improves relative inequality. This definition may be referred to as a relative approach, as it implies a reduction in relative inequality. Conversely, a measure of pro-poor growth is absolute if the poor receive the absolute benefits of growth equal to, or more than, the absolute benefits received by the non-poor. Under this definition, absolute inequality would fall during the course of economic growth.[4] In fact, this is the strongest requirement for achieving pro-poor growth, and may thus be referred to as 'super pro-poor'.

When growth is negative, poverty in general increases. However, there may be a situation where a negative growth results in poverty reduction. This situation can take place only if the effect of inequality reduction on poverty outweighs the adverse impact of negative growth on poverty. This negative growth scenario may be termed as 'strongly pro-poor'. Another classification of a growth scenario occurs when negative growth raises poverty. This may be termed as 'anti-poor' even if inequality improves during the course of growth. Taking a step further from anti-poor, a situation may be called 'strongly anti-poor' if both poverty and inequality become worse during the spells of negative growth.

PARTIAL OR FULL APPROACH

The *Partial approach* classifies under what conditions growth can be said to be pro-poor or anti-poor without specifying a poverty line and a poverty measure. A measure suggested by Ravallion and Chen (2003) falls into this classification in the sense that pro-poor growth is partly defined based on first-order dominance condition. Similarly, a pro-poor growth measure proposed by Son (2003) can be also categorized as partial because a growth process is primarily determined to be pro-poor (or not pro-poor) by stochastic dominance curves. The greatest advantage of using this partial approach is that it is valid for all poverty lines and poverty measures. On the other hand, one limitation of this approach is that if the dominance conditions are not met, then one cannot infer whether a growth process is pro-poor or not pro-poor. On this ground, the approach derived from the dominance conditions may be referred to as 'partial'. Under this partial approach, there are certain circumstances where it is impossible to draw conclusive results on the pattern of growth. Another limitation of the partial approach is that it does not provide an answer as to the degree of pro-poor

growth. In other words, the partial approach does not tell us by how much one growth process is more pro-poor than another growth process.

The **full approach**, on the other hand, is always able to provide us with a conclusive result as to whether or not growth is pro-poor. Studies – including McCulloch and Baulch (2000), Kakwani and Pernia (2000), and Ravallion and Chen (2003) – are based on the full approach.[5] This approach gives the complete rankings of growth processes because unlike the partial approach, a growth process under the full approach is judged from a rate or an index of pro-poor growth, not from a curve. To implement this full approach, though, a poverty line as well as a poverty measure need to be specified. This demands an inevitable value judgment in choosing the poverty line and poverty measures. The PEGR suggested in this paper can be regarded as the full approach.

MONTONICITY CRITERION

The **monotonicity** axiom implies that the magnitude of poverty reduction should be a monotonically increasing function of the pro-poor growth rate. As poverty reduction depends on both growth and the distribution of its benefits among the poor and the non-poor, growth alone is a necessary – but not sufficient – condition for poverty reduction.[6] This suggests that there is no monotonic relation between growth and poverty reduction. This calls for a measure of pro-poor growth that captures a direct linkage (or monotonic relation) with poverty reduction, indicating that poverty reduction takes into account not only growth but also how benefits of growth are shared by individuals in society. On this account, a pro-poor growth measure that satisfies the monotonicity axiom provides a necessary and sufficient condition for the reduction of poverty.

McCulloch and Baulch (2000) propose a measure of pro-poor growth known as the poverty bias of growth (PBG). The PBG is derived from the negative of the inequality component obtained from the symmetric poverty decomposition methodology, which was suggested by Kakwani (2000).[7] The PBG does not always satisfy the monotonicity criterion. Higher values of the PBG may not imply a greater reduction in poverty because poverty also depends on the growth effect.[8] Thus, the PBG will only satisfy the monotonicity criterion if it is assumed that the growth effect is constant (which is highly unlikely).

Ravallion and Chen's pro-poor growth measure also violates the monotonicity axiom. This occurs because they estimate their pro-poor growth measure using numerical integration up to the headcount ratio in the initial period (See Appendix). Their measure does not utilize the poverty rate in the terminal period.[9]

Kakwani and Pernia (2000) proposed an index to measure the degree of pro-poor index. This index is known as the pro-poor growth index (PPGI), and it is derived from the relation between total poverty reduction and poverty reduction in the case of distribution-neutral growth. In fact, this relation is expressed as the ratio of poverty elasticities, which will be greater than one when a growth scenario is pro-poor. The values of PPGI are defined separately for the trickle-down and immiserizing growth scenarios.[10] Like the PBG, the PPGI is merely an index that does not address the monotonicity axiom.

While the PPGI captures the distribution of growth benefits among the poor and non-poor, it does not take into account the level of the actual growth rate. In response to this, we propose in this paper another pro-poor growth measure called a 'poverty equivalent growth rate' (PEGR) which takes into account the limitation underlying the PPGI measure. Moreover, the PEGR satisfies the monotonicity criterion. Its formal derivation is shown in Section 4.

3 ADDITIVELY DECOMPOSABLE POVERTY MEASURES

Poverty can be conceptualized in terms of absolute deprivation suffered by the population. A person suffers from absolute deprivation if he or she cannot enjoy the society's minimum standard of living to which everyone should be entitled. Suppose income x of an individual is a random variable with distribution function given by F(x).[11] Let z denote the poverty line, which measures the society's minimum standard of living. A person suffers absolute deprivation if his or her income is less than z. If his or her income is greater than or equal to z, we say that he or she does not suffer any deprivation. H = F(z) is the proportion of individuals who suffer absolute deprivation because their income is below the society's minimum standard of living. H, thus, measures the incidence of poverty in the society and is called the headcount ratio.

The headcount ratio is a crude measure of poverty. It assumes that everyone whose income is below the poverty line suffers the same degree of deprivation. So it does not take account of the intensity of deprivation that is suffered by the poor. To take account of this intensity, we define the degree of absolute deprivation suffered by an individual with income *x* as

$$
\begin{aligned}
Dep(x) = \ & P(z,x) & if\ x<z \\
= \ & 0 & if\ x\geq z
\end{aligned}
\tag{1}
$$

where $P(z, x)$ is a homogenous function of degree zero in z and x.

$$\frac{\partial P(z,x)}{\partial x}<0$$

$$\frac{\partial^2 P(z,x)}{\partial x^2}>0$$

which means that the deprivation decreases strictly monotonically with income at an increasing rate. The degree of poverty in the society may be measured by the average deprivation that is suffered by the society, which is given by

$$\boldsymbol{q} = \int_0^z P(z,x)f(x)dx \tag{2}$$

where $f(x)$ is the probability density function of x. This is a general class of additive poverty measures.

Foster, Greer, and Thorbecke (1984) proposed a class of poverty measures that is obtained by substituting

$$P(z, \ x) = \left(\frac{z-x}{z}\right)^{a} \tag{3}$$

in (2), where a is the parameter of inequality aversion.[12]

A large number of the poverty measures that exist in the poverty literature can be shown to be particular members of the general class of additive poverty measures in (2). Among them, Watts' (1968) poverty measure, which is directly related to Theil's (1967) inequality measure, has all the desirable properties of a poverty measure. This measure is given by:

$$W = \int_{0}^{z} (Ln(z) - Ln(x)) f(x) dx \tag{4}$$

which takes into account the severity of deprivation suffered by the poor.

4 POVERTY EQUIVALENT GROWTH RATE

How does economic growth affect poverty reduction? To answer this question, we need to measure the factors that contribute to poverty reduction. Poverty reduction largely depends on two factors. The first factor is the magnitude of the economic growth rate: the larger the growth rate, the greater the reduction of poverty. Growth is generally accompanied by changes in inequality; an increase in inequality reduces the impact of growth on poverty reduction. To measure these two impacts, we differentiate equation (2) to obtain

$$\frac{dq}{q} = \frac{1}{q} \int_{0}^{z} \frac{\partial P}{\partial x} d(x) f(x) dx , \tag{5}$$

which follows from the assumption that P(z, z) = 0: if an individual's income is equal to the poverty line, then he or she does not suffer any deprivation.

Suppose $x(p)$ is the income level of population at the pth percentile. Equation (5) can be written as

$$dLn(q) = \frac{1}{q} \int_{0}^{H} \frac{\partial P}{\partial x} x(p) g(p) dp \tag{6}$$

where $g(p) = dLn(x(p))$ is the growth rate of income of people on the pth percentile.

Suppose L(p) is the Lorenz function, which measures the share of total income enjoyed by the bottom p proportion of population when the individuals in the population are arranged in ascending order of their income. Following Kakwani (1980), we can write

$$x(p) = m \ L'(p) \tag{7}$$

where m is the mean income of the society and $L'(p)$ is the first derivative of the Lorenz function. Taking logarithm of (7) and differentiating it, we obtain

$$dLn(x(p)) = dLn(m) + dLn(L'(p))$$

which immediately gives

$$g(p) = g + dLn(L'(p)) \tag{8}$$

where $g = dLn(m)$ is the growth rate of the mean income. Next, substituting (8) into (6) gives

$$dLn(q) = gh + \frac{1}{q}\int_0^H \frac{\partial P}{\partial x} x(p)dLn(L'(p))dp \tag{9}$$

where

$$h = \frac{1}{q}\int_0^H \frac{\partial P}{\partial x} x(p)dp \tag{10}$$

is the growth elasticity of poverty derived by Kakwani (1993), which is the percentage change in poverty when there is a 1 per cent growth in the mean income of the society, provided the growth process does not change inequality (when everyone in the society receives the same proportional benefits of growth). This elasticity is always negative.

Diving (9) by g gives

$$d = h + z \tag{11}$$

where

$$d = dLn(q)/g$$

is the total poverty elasticity and

$$z = \frac{1}{qg}\int_0^H \frac{\partial P}{\partial x} x(p)dLn(L'(p))dp \tag{12}$$

measures the inequality effect of poverty reduction. This tells us how poverty changes due to changes in inequality that is accompanied during the growth process. The growth is pro-poor (anti-poor) if the change in inequality that accompanies growth reduces (increases) the total poverty. [13] Thus, the growth is pro-poor (anti-poor) if the total elasticity of poverty is greater (less) than the growth elasticity of poverty.

We may now introduce the idea of poverty equivalent growth rate (PEGR). It is the growth rate $g *$ that will result in the same level of poverty reduction as the present growth rate g if the growth process had not been accompanied by any change in inequality (when everyone in the society had received the same proportional benefits of growth). The actual proportional rate of poverty reduction

is given by dg, where d is the total poverty elasticity. If the growth were distribution neutral (when inequality had not changed), then the growth rate $g*$ would achieve a proportional reduction in poverty equal to $hg*$, which should be equal to dg. Thus, the PEGR denoted by $g*$ will be given by

$$g* = (d/h)g = f\,g \qquad\qquad (13)$$

where $f = d/h$ is the pro-poor index, which was developed by Kakwani and Pernia (2000). This equation implies that growth is pro-poor (anti-poor) if $g*$ is greater (less) than g. If $g*$ lies between 0 and g, the growth is accompanied by an increasing inequality but poverty still reduces. This situation may be characterized as a trickle-down process when the poor receive proportionally less benefit from growth than the non-poor.

Taking a step further, growth may be defined as 'super pro-poor' if $g* \geq g\big(h*/h\big)$, where h^* is the elasticity of poverty with respect to growth when the benefits of growth are equally shared by every individual in society, . $h^* = \dfrac{m}{q}\int_0^H \dfrac{\partial P}{\partial x}dp$ In this case, pro-poor growth is defined as absolute, which would occur when the poor receive the absolute benefits of growth equal to or more than the absolute benefits received by the non-poor. Under this approach, absolute inequality would fall during the course of growth. Thus, this absolute approach sets out the strongest requirement for achieving pro-poor growth.

However, it is also possible that a positive economic growth can increase poverty, in which case $g*$ is negative. This can happen when inequality increases so much that the beneficial impact of growth is more than offset by the adverse impact of rising inequality. Bhagwati (1988) calls this "immiserizing" growth. He gives a scenario where the more affluent farmers adopt new seeds and raise grain production, resulting in lower prices. By contrast, the marginal farmers who cannot adopt the new technology find their stagnant output yielding even less income. Thus, the green revolution may immiserize the poor. This situation may be rare, however, because in the long run the marginal farmers may also catch up with the new techniques. The more common situation is where the poor farmers also benefit from economic growth but to a much smaller extent than the better-off ones.

During the recession period, when $g < 0$, poverty generally increases but if inequality reduces so much that poverty decreases, in which case $g* > 0$, then we call recession as strongly pro-poor. The recession will be pro-poor if $g < g* < 0$, in which case, poverty increases but the poor are hurt proportionally less than the non-poor. The recession will be anti-poor if $g* < g < 0$, in which case poverty increases and also the poor are hurt proportionally more than the non-poor.

The proposed PEGR controls how equitable growth rate is. Furthermore, it can be seen that the proportional reduction in poverty is an increasing function of $g*$: the larger $g*$ is, the greater will be the proportional reduction in poverty. Thus, maximizing $g*$ will be equivalent to maximizing the total proportional reduction in poverty. This suggests that a country's performance should be judged on the basis of the poverty equivalent growth rate and not by growth rate alone.

To make our message clearer, suppose a country's total poverty elasticity is 2/3 of the growth elasticity of poverty. Then from (13), we note that the country's

actual growth rate of 9 per cent is equal to the poverty equivalent growth rate of only 6 per cent. Thus, the effective growth rate for poverty reduction is 3 per cent lower than the actual growth rate because the country is not following pro-poor policies. On the other hand, if the total poverty elasticity is supposedly 20 per cent higher than the growth elasticity of poverty, then the country's actual growth rate of 9 per cent will be equal to the poverty equivalent growth rate of 10.8 per cent. This indicates that the growth is pro-poor because the effective growth rate for poverty reduction is 1.8 per cent higher than the actual growth rate.

In view of (6) and (10), (13) can be written as

$$
g* = \frac{\int_0^H \frac{\partial P}{\partial x} x(p) g(p) dp}{\int_0^H \frac{\partial P}{\partial x} x(p) dp}
\tag{14}
$$

which shows that the PEGR is the weighted average of the growth rates of income at each percentile point, with the weight depending on the poverty measure used. So $g*$ can be computed for any poverty measure. For Foster, Greer, and Thorbecke's class of poverty measures, it is given by

$$
g_a^* = \frac{\int_0^H (\frac{z - x(p)}{z})^{a-1} x(p) g(p) dp}{\int_0^H (\frac{z - x(p)}{z})^{a-1} x(p) dp}
\tag{15}
$$

for $a \geq 1$. When $a = 1$, we get PEGR for the poverty gap ratio as

$$
g_1^* = \frac{\int_0^H x(p) g(p) dp}{\int_0^H x(p) dp}
$$

which shows that the growth rate of each poor individual receives the weight that is proportional to the person's income. This suggests that g_1^* is completely insensitive to the distribution of income among the poor.

The PEGR for the Watts poverty measure is obtained by substituting $P(z,x)=Ln(z)-Ln(x)$ in (14) as

$$
g_w^* = \frac{1}{H} \int_0^H g(p) dp
\tag{16}
$$

which in fact is the pro-poor growth index proposed by Ravallion and Chen (2002). They derived their index by a different methodology, which is consistent only with

the Watts poverty measure. We have provided a general methodology encompassing all the additive separable poverty measures.

5 HOW TO CALCULATE THE POVERTY EQUIVALENT GROWTH RATE

The previous section presented the ex-ante analysis of changes in poverty. We analyzed the change in poverty for many alternative scenarios. In that analysis, it was necessary to assume that the change in inequality takes place only by a constant proportional shift in the Lorenz curve at all points. As pointed out, the Lorenz curve can change in an infinite number of ways and thus the ex-ante analysis of change in poverty is not possible under this general situation. However, we can make an ex-post analysis of changes in poverty if we have household surveys for at least two periods. This section presents a methodology to estimate the PEGR by utilizing unit record data available for any two periods.

The general class of poverty measure q given in (2) is fully characterized by the poverty line z, the mean income m, and the Lorenz curve L(p). That is:

$$q = q\ (z,\ m,\ L(p))$$

Suppose the income distributions in the initial and terminal years have mean incomes m_1 and m_2 with the Lorenz curves $L_1(p)$ and $L_2(p)$, respectively. An estimate of total poverty elasticity can be estimated by

$$\hat{d}\ = (Ln\ [q\ (z,\ m_2\ ,\ L_2(p)] - Ln[q\ (z,\ m_1\ ,\ L_1(p)])/\hat{g}$$

where $\hat{g}$ is given by

$$\hat{g}\ = Ln\ (\ m_2\ ) - Ln\ (\ m_1\ )$$

which is an estimate of growth rate of mean income.

An estimate of PEGR is given by

$$\hat{g}\ * = (\hat{d}\ /\hbar)\ \hat{g} \tag{17}$$

where $\hbar$ is an estimate of the growth elasticity of poverty, which should satisfy equation (11):

$$\hat{d} = \hbar + \hat{z} \tag{18}$$

where $\hat{z}$ is an estimate of the inequality effect of poverty reduction. Kakwani's (2000) poverty decomposition methodology can then be used to calculate $\hbar$ and $\hat{z}$ by the following formulae:

$$\hbar\ =\ \frac{1}{2}\left[\ln\left(q\left(z, m_2, L_1\left(p\right)\right) - \ln\left(q\left(z, m_1, L_1\left(p\right)\right) + \ln\left(q\left(z, m_2, L_2\left(p\right)\right) - \ln\left(q\left(z, m_1, L_2\left(p\right)\right)\right)\right]\right/\hat{g}\right.$$

and

$$\hat{z} = \frac{1}{2}\left[\ln\left(q(z,\boldsymbol{m}_1,L_2(p))\right) - \ln\left(q(z,\boldsymbol{m}_1,L_1(p))\right) + \ln\left(q(z,\boldsymbol{m}_2,L_2(p))\right) - \ln\left(q(z,\boldsymbol{m}_2,L_1(p))\right)\right]/\hat{\boldsymbol{g}}$$

which will always satisfy equation (18).[14] This methodology can be used to estimate the PEGR for the entire class of poverty measures given in (2).

The proportional reduction in poverty is equal to $\hat{\boldsymbol{d}}\,\hat{\boldsymbol{g}}$, which is equal to $\hat{\boldsymbol{h}}\hat{\boldsymbol{g}}*$ from (19). Since $\hat{\boldsymbol{h}}$ is always negative (unless $\boldsymbol{m}_1 = \boldsymbol{m}_2$), the magnitude of poverty reduction will be a monotonically increasing function of $\hat{\boldsymbol{g}}*$; the larger the $\hat{\boldsymbol{g}}*$, the greater the percentage reduction in poverty between the two periods. Thus, maximizing $\hat{\boldsymbol{g}}*$ will be equivalent to maximizing the percentage reduction in poverty.[15]

6 DATA SOURCES AND CONCEPTS USED

The data for Korea comes from the country's household survey, which is called the Family Income and Expenditure Survey (FIES) and is conducted every year by the National Statistical Office in Korea. These household surveys are unit-recorded data, and are used for this study covering the period from 1990 to 1999. They include income and consumption components for more than 20,000 households in urban areas. We utilized the Minimum Cost of Living (MCL) basket developed in 1994 by the Korean Institute for Health and Social Affairs (KIHASA) as the poverty line. We modified this poverty line by taking into account different costs of living between Seoul and other cities. The poverty line has been updated for other years by using the separate consumer price indices for Seoul and other cities.

It must be emphasized that we have used a Korea-specific poverty line, which measures the minimum acceptable standard of living in Korea. Therefore, the incidence of poverty computed here cannot be compared with the incidence of poverty in other countries. Our main objective here is to analyze changes in poverty and how it has been affected by the economic growth in Korea.

The data source for Thailand comes from the Socio-Economic Surveys (SES) covering the period from 1988 to 1998. These SES data are unit record household surveys conducted every two years by the National Statistical Office in Thailand. The survey is nation-wide and covers all private, non-institutional households residing permanently in municipals, sanitary districts, and villages. However, it excludes parts of the population living in transient hotels or rooming houses, boarding schools, military barracks, temples, hospitals, prisons, and other such institutions. The SES contains information on more than 17,000 households on average between 1988 and 1998.

In estimating poverty, this paper uses the official poverty line developed for Thailand, which takes into account spatial price indices as well as individual needs that differ depending on household size and its composition.

For the Vietnam case, the Vietnamese Living Standard Surveys (VLSS) are utilized covering the period 1992/93 – 1997/98. While the 1992/93 VLSS included 4,800 households, 5,999 households were interviewed in the 1997/98 VLSS. These comprise the Living Standard Measurement Surveys (LSMS), which provide

information on total expenditure of each household included in the survey. The poverty lines used for this study are 1,160.842 and 1,793.903 thousand dong per capita per annum in 1992-93 and 1997-98, respectively.

We use per capita welfare consumption expenditure as a welfare measure in estimating poverty in Korea, Thailand, and Vietnam. Per capita welfare consumption expenditure is expressed as the ratio of per capita total consumption expenditure to the per capita poverty line (expressed in percentage).

7 THREE COUNTRY CASE STUDIES

As presented in Table 1, (Figure 1) the poverty equivalent growth rates are overall higher than the actual growth rates in Korea during the 1990s. This is particularly so before the crisis. For example, the PEGR was 9 per cent in 1996-97, whereas the annual growth rate was actually only 1.8 per cent in that same period. What does this imply? It suggests that before the crisis, the poor benefited proportionally much more than the non-poor, as was reflected in a dramatic reduction in poverty; the head-count ratio in Korea decreased from 39.6 per cent in 1990 to 8.6 per cent in 1997 (Kakwani and Son, 2000). This rapid reduction in poverty during the 1990-97 period was achieved due to two factors. One factor was a high economic growth rate of about 7-8 per cent per annum that had prevailed in the economy. The other factor was a steady decline in inequality,[16] which facilitated a rapid reduction in poverty in addition to the positive growth rates.

TABLE 1
Poverty Equivalent Growth Rates for Korea

Year	Actual Growth Rate	Poverty Equivalent Growth Rate		
		Percentage of poor	Poverty gap ratio	Severity of poverty ratio
1990-91	9.6	10.7	10.4	10.0
1991-92	4.0	4.1	3.7	3.6
1992-93	4.8	5.8	6.6	6.8
1993-94	7.3	7.2	7.3	7.5
1994-95	8.2	9.7	9.5	8.9
1995-96	5.8	5.1	5.0	4.6
1996-97	1.8	9.0	8.3	9.6
1997-98	-7.6	-9.0	-10.0	-10.9
1998-99	9.8	9.6	10.5	11.5

FIGURE 1
Growth and Poverty Equivalent Growth rates: Korea

years
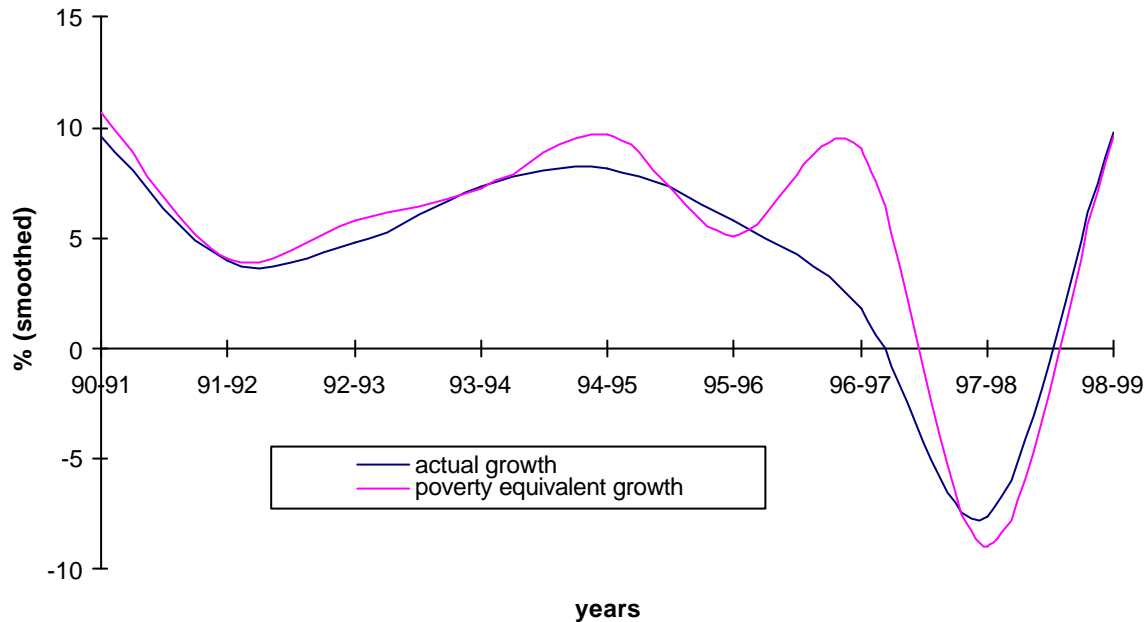
After the onset of the financial crisis, actual growth rates became higher than the PEGRs between 1997 and 1999. This indicates that the crisis had adverse impacts on the poor rather than on the non-poor. This result is to be expected as poor people are more vulnerable to such unexpected economic shocks. This, in turn, calls for a permanent system of social safety net, which can protect vulnerable groups of people in society from economic downturns.

Note that there has been a sign of recovery in the economy in 1998-99; the head-count ratio declined from 19 per cent in 1998 to 13.4 per cent in 1999 (Kakwani, 2000). Despite this positive sign, our result suggests that the growth process is not classifiable as pro-poor. The benefits generated from the positive growth during 1998-99 did flow proportionally to the non-poor more than to the poor. More interestingly, our result points out that compared to the non-poor, the poor overall benefited less from the recovery process; among the poor people the ultra-poor received proportionally more benefits. This could have happened because of the Korean government's prompt response to the crisis through social welfare programs. In response to the financial crisis, the government introduced many social welfare programs – including public works programs and temporary livelihood protection. Public works programs were particularly effective in helping the ultra-poor, who were largely unemployed and laid-off within the labor market during the economic downturn. Similarly, temporary livelihood protection (which was implemented based on an income means test) was also more helpful to the ultra-poor.

TABLE 2
Poverty Equivalent Growth Rates for Thailand

Year	Actual Growth rate	Poverty Equivalent Growth Rate		
		Headcount ratio	Poverty gap ratio	Severity of poverty ratio
1988-90	9.06	5.5	5.9	6.1
1990-92	7.49	4.3	3.4	3.0
1992-94	7.65	8.8	8.7	8.8
1994-96	5.75	7.4	7.2	7.2
1996-98	-1.00	-2.7	-2.5	-2.5
1998-00	-0.85	-2.3	-3.8	-4.4
1988-2000	4.68	3.6	3.3	3.1

FIGURE 2

Growth and Poverty Equivalent Growth rates: Thailand
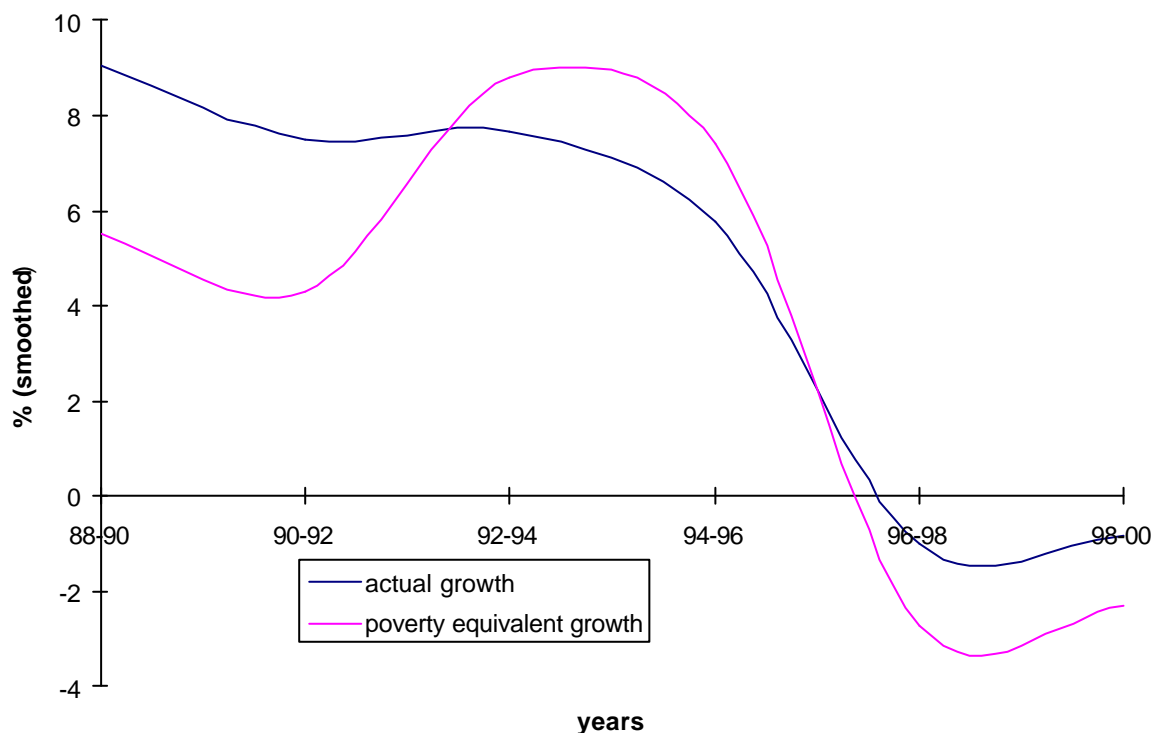
What has been Thailand's growth experience in the 1990s? During 1988-92, growth was not classified as pro-poor. (Table 2 and Figure 2). In spite of an almost 10 per cent annual rate of economic growth for that period, the growth process did not proportionally benefit the poor more than the non-poor. This occurred because the adverse impacts of the increase in inequality in that period had counteracted and in fact outweighed the favorable impacts expected from the economic growth.[17] In particular, the proportional benefit flowing to the ultra-poor in 1990-92 was much less than that flowing to the poor: the magnitude of PEGRs becomes smaller because the poverty measure is more sensitive to the well-being of the poorest person.

The trend was reversed during 1992-96, when the PEGRs were higher than the actual growth rates. Thus, growth is defined as pro-poor between 1992 and 1996 in that it benefited the poor proportionally more than the non-poor. The pro-poor growth resulted from the positive effects of both high growth rates and inequality decline over the period.[18]

During 1996-2000, the Thai economy was influenced by the financial crisis. As expected, its economic and social impacts were extremely detrimental: while the growth in per capita welfare declined by an annual rate of almost 1 per cent, poverty increased sharply from 11.4 per cent in 1996 to 16.2 per cent in 2000 (Son 2002). As shown in Table 2, the adverse impacts of the crisis were prevalent throughout the period and were deepened among the ultra-poor in 1998-2000. Unlike Korea, there were no prompt responses to the crisis from the Thai government to protect the ultra-poor and the vulnerable from the economic shock.

Although the Thai government has provided little by way of programs constituting social safety nets, the financial crisis has clearly enabled the government to learn how existing social systems function under duress. The crisis has revealed that considerable effort needs to be directed to the setting up, or further development, of social safety nets in the country. This is especially so because traditional family systems of support – though resilient during the early part of the crisis – are likely to weaken over time, given continuous socioeconomic change and urbanization, and the further demands placed on them. Household coping mechanisms and the informal safety nets provided through traditional family systems have their limitations during such a crisis.

TABLE 3
Poverty Equivalent Growth Rates for Vietnam: 1992/93 – 1997/98

Measures	Total	Urban	Rural
Actual growth rate	5.02	5.28	4.04
Poverty Equivalent Growth Rates for			
Headcount ratio	5.08	6.28	4.61
Poverty gap ratio	5.33	6.46	5.04
Severity of poverty	5.43	6.59	5.19
Watts index	5.39	6.49	5.13

Table 3 presents the empirical results for Vietnam. It shows that during the 1992-97 period, the PEGRs were consistently higher than the annual growth rates of per capita expenditure (5.02 per cent for Vietnam as a whole). This indicates that the growth process in the country was pro-poor in a way that benefited the poor proportionally more than the non-poor. The PEGR for the severity of poverty index is greater than those for the poverty gap ratio and the poverty incidence. This implies that during 1992-97, growth in Vietnam had more beneficial impact on the ultra-poor. Similarly, both urban and rural sectors have experienced pro-poor growth. This occurred because while both sectors enjoyed high growth rates, both also showed a decline in inequality, as estimated by the Gini index of per capita expenditure. The Gini index for urban areas fell from 35.07 per cent in 1992/93 to 34.17 per cent in 1997/98, whereas for rural areas it declined to 26.42 per cent in 1997/98 from 28.86 per cent in 1992/93 (Son, 2003).

Vietnam has emerged as one of the fastest-growing economies in Asia over the last two decades. More importantly, our results have presented that its growth process undertaken during 1992/93 – 1997/98 has been pro-poor, thus benefiting the poor proportionally more than the non-poor. This has been attributed to a series of reforms, known as *doi moi*, which were launched in the latter part of the 1980s. Reforms began primarily in the agricultural sector which, at the time, accounted for close to 40 per cent of GDP and 70 per cent of total employment. The country's reform effort focused initially on the dismantling of collective farms, the redistribution of land to peasant households through long-term leases, and an abolition of price controls on goods and services. It then eliminated production and consumption subsidies and streamlined the public sector (Dollar and Litvack 1998, Weinns 1998). Furthermore, the reform effort included the stabilization of inflation and the liberalization of foreign trade and investment (Dollar 2002). This series of reforms paved the way for the country's spectacular growth in the 1990s, which in turn contributed to a remarkable poverty reduction.

8 CONCLUDING REMARKS

This paper has proposed a measure of pro-poor growth denominated 'poverty equivalent growth rate'. The poverty equivalent growth rate has been derived for an entire class of additively decomposable poverty measures – including the FGT and Watts measures. This measure takes into account not only the magnitude of growth, but also the manner in which the benefits of growth are distributed to the poor and the non-poor. It has been argued in the paper that this new measure satisfies the monotonicity axiom, which sets out a condition that the proportional reduction in poverty is a monotonically increasing function of the poverty equivalent growth rate. As the poverty equivalent growth rate meets the monotonicity criterion, it can be said that in order to achieve a rapid reduction in poverty, the poverty equivalent growth rate should be maximized rather than the actual growth rate.

The poverty equivalent growth rate takes a strict approach to defining pro-poor growth in a way that takes into account either improvement or reduction in inequality, as well as in poverty, during growth spells. What is more, the poverty equivalent growth rate is further classified into relative and absolute approaches. Its relative and absolute measures are formally derived in this paper. The relative concept arises when growth benefits the poor proportionally more than the non-poor, causing relative inequality to fall. In this scenario, the income of the poor may increase at a faster rate than that of the non-poor, but their absolute income gains will still be smaller. In contrast, the absolute concept occurs when the absolute benefits of growth received by the poor are more than or equal to the absolute benefits received by the non-poor. Under this definition, absolute inequality would be expected to fall during the course of growth. In fact, the absolute approach lays out the strongest requirement for pro-poor growth and has thus been termed 'super pro-poor'.

The methodology developed in this paper has been applied to a few Asian countries, including Korea, Thailand, and Vietnam. By and large, while Korea and Vietnam have experienced a pro-poor growth pattern in the 1990s, Thailand has on the whole not been pro-poor. Two other important policy implications emerge from the empirical analysis. Firstly, the financial crisis experienced by both Korea and Thailand at the end of the 1990s has revealed that considerable effort needs to be directed to the setting up, or further development, of social safety nets in these countries. Although the Korean government's response to the crisis included the prompt introduction of various social welfare programs, the crisis demonstrated a call for social safety nets to be enacted on a permanent basis. During the crisis it was realized that household-coping mechanisms and traditional family systems of support cannot insulate people from such substantial economic shocks. Secondly, as the Vietnam experience presents, a 'growth with redistribution' strategy has played a significant role in achieving impressive growth and poverty outcomes. Redistribution policies, such as land reforms, may be necessary to set up the economic and political conditions necessary to ensure that subsequent economic growth is not highly unequalizing (Adelman 1975). This has also proved to be the case for some countries – including Korea and Taiwan - in their early stages of economic development.

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APPENDIX

In this Appendix, we demonstrate theoretically as well as empirically with the help of a hypothetical example, that Ravallion and Chen's (2003) estimate of pro-poor growth will violate their basic *Axiom* 1:

Axiom 1: The measure should be consistent with the direction of change in poverty, in that a positive (negative) rate of pro-poor growth implies a reduction (increase) in poverty.

The violation of this axiom will imply that the magnitude of poverty reduction will not necessarily be a decreasing function of the pro-poor growth.

The estimate of Ravallion and Chen's (2003) is given by

$$\mathrm{RC_t} = \frac{\int_0^{H_{t-1}} \Delta Ln(x_{t-1}(p))dp}{H_{t-1}} \tag{A.1}$$

where H_{t-1} is the head-count ratio in period t-1. The motivation of this index comes from their equation:

$$dW = -\int_0^H d\ln(x(p))dp \tag{A.2}$$

where *W* is the Watts measure of poverty.

In order that Axiom 1 is satisfied, $\mathrm{RC_t} > 0$ (<0) should always imply $\Delta W_t < 0$ (>0), where

$$\Delta W_t = \int_0^{H_t} Ln(z/x_t(p))dp - \int_0^{H_{t-1}} Ln(z/x_{t-1}(p))dp$$

which will not always hold because equation (A.2) does not imply equation (A.3) given by

$$\Delta W_t = -\int_0^{H_{t-1}} \Delta \ln(x(p))dp \tag{A.3}$$

Thus, Ravallion and Chen's (2003) estimate of pro-poor index will violate *Axiom* 1, which implies that the magnitude of poverty reduction will not necessarily be a decreasing function of the pro-poor index.

Table A.1 presents a hypothetical example giving welfare levels of 20 persons. The poverty line is 100. It can be seen that the percentage of poor has decreased from 50 per cent to 35 per cent but the Watts measure has increased from 20.3 to 22.8. The Ravallion and Chen's index of pro-poor growth is computed to be 11.3 per cent, which means that Ravallion and Chen's index violates their basic *Axiom* 1.

This also implies that maximization of Ravallion and Chen's index does not necessarily lead to the maximization of poverty reduction. This monotonicity property is always satisfied by our pro-poor growth measure.

TABLE A.1
A hypothetical example

Number of People	Welfare in		Percentage of poor		Watts measure		Growth rate of welfare	R-C pro-poor index
	Period 1	Period 2	Period 1	Period 2	Period 1	Period 2		
1	25	30	100	100	138.6	120.4	20.0	20.0
2	58	40	100	100	54.5	91.6	-31.0	-31.0
3	60	40	100	100	51.1	91.6	-33.3	-33.3
4	65	50	100	100	43.1	69.3	-23.1	-23.1
5	70	80	100	100	35.7	22.3	14.3	14.3
6	75	100	100	0	28.8	0.0	33.3	33.3
7	80	120	100	0	22.3	0.0	50.0	50.0
8	85	90	100	100	16.3	10.5	5.9	5.9
9	90	60	100	100	10.5	51.1	-33.3	-33.3
10	95	200	100	0	5.1	0.0	110.5	110.5
11	100	120	0	0	0.0	0.0	20.0	0.0
12	105	150	0	0	0.0	0.0	42.9	0.0
13	110	120	0	0	0.0	0.0	9.1	0.0
14	115	120	0	0	0.0	0.0	4.3	0.0
15	120	120	0	0	0.0	0.0	0.0	0.0
16	125	120	0	0	0.0	0.0	-4.0	0.0
17	130	120	0	0	0.0	0.0	-7.7	0.0
18	135	120	0	0	0.0	0.0	-11.1	0.0
19	140	120	0	0	0.0	0.0	-14.3	0.0
20	145	120	0	0	0.0	0.0	-17.2	0.0
Average	**96.4**	**102**	**50**	**35**	**20.3**	**22.8**	**5.8**	**11.3**

Note: R-C pro-poor index: Ravallion & Chen pro-poor index.

NOTES

1. Other studies include Christiaensen et. al. (2002), White and Anderson (2001) and World Bank (2000).

2. In relation to defining and measuring pro-poor growth there are also studies proposed by White and Anderson (2001), Hanmer and Booth (2001), Klasen (2003), and Duclos and Wodon (2003).

3. If we extend the World Bank's definition of pro-poor growth, to pro-poor policies, then any policy that reduces poverty (however small) will be identified as pro-poor policy, which means that a policy will be pro-poor even if the poor receives a fraction of the benefits received by the rich. To label such a policy as pro-poor is a misnomer, because it is obvious highly anti-poor.

4. If everyone's income increases by the same amount, a measure of absolute inequality will remain constant, whereas a measure of relative inequality will show a reduction.

5. The pro-poor growth measure suggested by Ravallion and Chen (2003) is based on both partial and full approaches: It first derives the growth incidence curve (partial approach) and, at the second stage, it derives the pro-poor growth rate as the area under the growth incidence curve (full approach).

6. In some situations, growth may not be necessary. For example, even a zero or negative growth can reduce poverty provided there is a sufficient redistribution of income in favor of the poor. But such a situation may not be sustainable in the log run. In the long run, we may say that growth is necessary but not sufficient for poverty reduction. Thus, the maximization of growth alone does not imply a maximum reduction in poverty.

7. To evaluate whether growth is pro-poor (or anti-poor), the PBG measures the extent to which the observed pattern of growth deviates from a distributionally neutral benchmark. McCulloch and Baulch capture the measure of pro-poor growth by comparing the actual distribution of income with the one that would have occurred under the distribution-neutral scenario. In this respect, their measure reflects a relative approach to defining pro-poor growth.

8. The growth effect measures the change in poverty due to a change in mean income when the distribution of income does not change.

9. See Appendix, which shows that Ravallion and Chen's pro-poor growth measure violates monotonicity using a numerical example. Similarly, Klasen (2003) has pointed out that as Ravallion and Chen's measure deals with the growth rates of quantiles of the income distribution, individuals in the initial period may be excluded from the terminal period or vice versa in the process of calculating the pro-poor growth rate suggested by Ravallion and Chen.

10. PPGI lies between zero and one in the case of trickle-down, whereas the index is negative for immiserizing growth scenarios. Immiserizing growth refers to as a situation where a positive growth increases poverty (Bhagwati 1988).

11. Instead of income, one can use consumption to measure poverty. Consumption is more widely used than income. The methodology presented in this paper does not change when we replace income by consumption.

12. When a =0, 1, 2, the poverty measure is the headcount ratio, poverty gap ratio, and the severity of poverty index.

13. Many studies measure the pro-poorness of growth by the changes in the Gini index.
The Gini index is not an appropriate measure of inequality to measure pro-poor growth, because there exist no monotonic relationship between changes in the Gini index and the poverty reduction. With mean income remaining the same, an increase or decrease in the Gini index can still leave poverty unchanged or an increase (decrease) in the Gini index can lead to a reduction (increase) in poverty. Thus, a change in the Gini index can not always tell whether or not growth is pro-poor. ζ defined in (12) has a direct relation with changes in poverty. It is based on that part of the Lorenz curve which directly affects the poor.

14. Kakwani (2000) justified this decomposition using an axiomatic approach. Kraay (2003) estimated the growth and inequality effects using Datt and Ravallion's (1992) poverty decomposition, which consists of three components, namely, growth component, inequality component and a residual term. He calls this decomposition as the discrete-time analog of (11). Equation (11) consists of only growth and inequality components. So estimating (11) using a discrete a discrete-time analog with three components will give inconsistent estimates of growth and inequality components.

15. Our estimator of PEGR satisfies the monotonicity requirement but in the Appendix we show that the pro-poor growth rate proposed by Ravallion and Chen (2003) violates the monotonicity axiom.

16. The Gini index steadily declined from 29 per cent in 1990 to 27.9 per cent in 1997 (Son 2002).

17. While the Gini index of income increased from 45.1 % in 1988 to 49.9 % in 1992, the Gini index of consumption increased from 40.3 % in 1988 to 41 % in 1992 (Kakwani and Son 2000).

18. The Gini index declined from 41 and 39.2 per cent in 1992 and 1996, respectively (Kakwani and Son 2000).